How is noise modeled?

The primary means of assessing military environmental noise is through computer modeling. Computer noise models require various operational data, such as types of operations/ weapons and number, location, and time of training. The output from the models is summarized on installation land use maps in the form of noise contours. This fact sheet presents information about the various computer models used to generate noise contour maps. *Note: Noise contours are not generated from actual noise measurements because the process would be too labor- and equipment-intensive, requiring months of monitoring at hundreds of measurement sites.*

Calculating Average Noise Levels

Department of Defense bases/installations use computer modeling programs to determine the average daily noise for aircraft operations generated over the period of one year. Generally, moments of quiet are averaged together with moments where loud noises can be heard. The models also add a 10-decibel penalty to nighttime noise (10 pm to 7 am) to account for higher annoyance usually associated with nighttime noise events. In California, a 5-decibel penalty is also included for evening noise events (7 pm to 10 pm).

High-Energy Impulsive Noise (abrupt, short-duration noise such as from explosions and artillery)

The noise simulation program used to assess large-caliber (20-millimeter and greater) weapons is BNOISE2. It models the noise from the muzzle blast, the explosive detonation at impact, and the bow shock caused by the round going down range. The effects of terrain on sound travel (propagation) are also included. The BNOISE2 program requires operational data concerning type of weapons fired from each range or firing point, including demolitions, the number and type of rounds fired from each weapon, the location of targets for each range or firing point, the amount of propellant used to reach the target and time of day.

Aircraft Noise

Noise contours for aircraft activity at an airfield are generated using the NOISEMAP computer program. The required inputs to the program are the location of the flight tracks, aircraft altitudes, the number of each type of aircraft using each flight track and time of day.

Rotary-wing noise, including helicopters and tilt-rotors, is modeled using the Rotorcraft Noise Model (RNM) originally developed by NASA. RNM includes sound hemispheres around the aircraft based on various performance parameters and propagates noise in the rotor plane. Thus, rotary wing noise can be described fore and aft of the aircraft as well as in front of and behind the advancing blade.

The noise zones for the helicopter Nap of the Earth (NOE) routes and low-altitude flight tracks are generated using the HELOSLICE computer program. HELOSLICE is a simplified version of the NOISEMAP computer program, developed to predict the noise from operations at remote landing areas, flight tracks, and NOE routes. The required inputs to this model include the number and type of helicopter using each area or route and the altitude of the helicopter at the point of interest.

Insert installation name here

ROUTEMAP is a model that calculates the noise levels on the ground along a military training route (MTR). The inputs to the model are the altitude, power setting, speed and number of operations by aircraft type for a one-month period.

Small Arms Noise

The Small Arms Range Noise Assessment Model (SARNAM) computer program is used to generate the noise contours for small arms (up to 50-caliber) ranges weapon systems. It includes an extensive selection of weapons in the source library and can incorporate information from multiple ranges of various types.

Predicting Noise and Annoyance from Infrequent Events

Average daily noise levels can sometimes understate the severity of an infrequent, single-noise event because annoying noise peaks can be "averaged out." So it is helpful to be able to measure specific noise levels from single events, such as artillery firings or explosive detonations. This information can be useful when predicting annoyance and potential complaints. The BNOISE2 and SARNAM computer models include the capability to predict the single-event levels. The following models are also used to predict single-event levels.

High-Energy Impulsive Noise

The single-event noise levels from impulsive activities are predicted using the SHOT computer model. The effect of topography features between the noise source and the receiver is included in the model. The inputs to this model are the explosive weight or weapon and propellant charge size, distance between the source and the receiver, burial depth or elevation height if applicable, and location and height of a barrier, berm or hill, if one exists, between the source and receiver.

PEAKEST is a computer model used to predict the peak levels from the demolition of standard engineering and named explosives. It is used when the noise levels from an explosive detonation are required for planning and siting of these activities and for National Environmental Policy Act (NEPA) documentation.

Other Aircraft Noise

MR_NMAP is a computer model used to calculate the subsonic noise impact from aircraft operations in a military operations area (MOA) and in special use airspaces. The model includes an operations input program that describes the aircraft flight operation in existing or new airspace.

PCBOOM3 is a program that computes single-event sonic boom footprints from any supersonic vehicle maneuver. The use specifies the aircraft, the maneuver, and the atmosphere. The primary output is the sonic boom footprint in terms of equal over pressure on the ground, relative to the aircraft's position.

For more information about the Army's noise management program contact:

Operational Noise Program
U.S. Army Center for Health Promotion and Preventive Medicine
MCHB-TS- EON
Aberdeen Proving Ground, MD 21010-5403
410-436-3829
http://chppm-www.apgea.army.mil/dehe/morenoise/

For more information on the Navy's Noise Management Program contact:

Special Assistant for AICUZ and Encroachment
Commander Navy Installations
Naval Facilities Engineering Command
Washington Navy Yard, Washington DC 20374
202-685-9181

For more information on the Air Force's Noise Management Program contact:

AICUZ/Noise Program Manager
Bases and Units Branch
HQ USAF/ILEPB
1260 Air Force Pentagon
Washington, D.C. 20330.
703-604-5277

For more information on the Marine Corp's Noise Management Program contact:

Community and Land Use Planner for AICUZ
Headquarter Marine Corps
Washington DC, 20380-1775
703-695-8240, ext 3350

This fact sheet is part of *Tri-Services Community and Environmental Noise Primer.* This guide, along with its companion CD, can help you educate and engage stakeholders on and off your installation, and generate support for noise management activities.

Insert local contact information here